NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

FACT SHEET

(Pursuant to NAC 445A.874)

Permittee Name: **Round Mountain Gold Corporation**
Permit Number: **UNEV 87056**

A. Description of Discharge

August 2008 update: The system has not been operated from the time the fact sheet was last updated in 1999 to the present. Two geothermal production wells permitted by the Division of Minerals (PW-1 and PW-2) were abandoned in January 2007. The UIC permit is being renewed to allow future use of the existing injection well, and/or construction of new injection wells already authorized. The permit requires NDEP to be notified of any changes such as well startups, drilling of new wells, etc. The site will continue to be monitored to ensure groundwater is not being degraded.

Location: Up to four (4) injection wells, to receive geothermal fluid only, to be located at the Round Mountain Gold Mine (Round Mountain Gold Corporation -- Smoky Valley Common Operation), in Sections 24, 25, 26, 35 and 36 of Township 10N, Range 43E, M.D.B&M.

There is currently one (1) existing and approved injection well, located in T10N, R43E, Section 25, M.D.B.&M., Nye County, Nevada. In addition to injection, the applicant occasionally uses bermed, unlined, holding ponds for diversion of fluids derived from maintenance procedures or well testing, which are also covered by this permit.

Fluid Characteristics: The injectate consists of geothermal fluid that has been passed through a closed loop system with a flat plate heat exchanger used for heating cyanide leaching solutions. The exchanger is equipped with a leak detection system to ensure that cyanide does not contaminate the injectate. Chemical additives are not routinely used, although the use of a microbicide to control corrosion was approved by the Division in 1994. The injectate fluids typically average about 350 mg/l TDS. Fluoride values are about 20 mg/l and exceed primary and secondary drinking water standards. Depending on the individual production well, the injectate often slightly exceeds primary drinking water standards for arsenic, set at .05 mg/l. In addition to exceeding the fluoride and arsenic Maximum Contaminant Levels (MCLs) geothermal fluids are moderately alkaline and are associated with slightly elevated levels of boron, lithium, and strontium.

The system is operated only periodically and was last active in 1996. Currently there are three production wells, permitted by the Nevada Division of Minerals.

B. Synopsis

August 2008 Update: No changes will be made to the permit due to the fact the existing injection well has not been used in recent years, and notification to NDEP is required if it is used. Monitoring will continue to ensure groundwater is not being degraded.

General: Round Mountain Gold Corporation (RMGC) operates a large open pit Gold Mine, located in northern Nye County, on the west flank of the Toquima Range, and on the east edge of northern Big Smoky Valley (**Figure 1, Location Map**). Much of the ore is placed on lined heaps and leached using dilute cyanide solution. The existence of a geothermal system near the mine area has allowed RMGC to heat the cyanide solution for enhanced recoveries during cold weather, on an as needed basis. The original permit was issued December 16, 1987, and subsequently renewed in January of 1993. The applicant has applied for a renewal for their existing area permit as described under section A. The system was last operated in 1996, and would require substantial testing and some repair prior to renewed operation, with work to be approved by the Division as a permit condition.

The injection well and production wells are located on the alluvial fan west and southwest of the Round Mountain Open Pit Gold Mine, adjacent to waste rock dumps and ore leach pads (**Figure 2, Site Map**). The three existing production wells, permitted by the Nevada Division of Minerals, are located approximately 4000 feet south/southeast of the injection well IJ-1, and vary in depth between 935 feet and 1610 feet. The geothermal system is controlled by a range front fault structure. Production water temperature is about 180 Deg. F, and after heat exchange, injectate temperature averages approximately 70 Deg. F. Geothermal fluids are derived from a sequence of fractured welded tuffs which, at the location of the production wells, are found below a depth of 105 feet. The utilized production zone is about 700 to 1600 feet below ground surface. Injection well IJ-1 has a total depth of 1305 feet, with alluvium, consisting of mixed Quaternary sand and gravel, to 850 feet and Tertiary welded ash flow tuffs below. The injection interval is into fracture zones within the bedrock, between 860 feet and the Total Depth (TD). The hole is cased with a cement seal to 860 feet, with an open uncased hole from 860 feet to TD.

Fluids are injected back into the same geothermal system, with receiving waters having approximately the same levels of arsenic and fluoride. Table 1 compares the characteristics of the injectate to the receiving reservoir fluids.

Production rates and injection volumes have historically varied, due to mining production requirements and the severity of annual winter weather. The following illustrates the range of variability. During January of 1993, there were two injection wells (injection well IJ-2 has since been plugged and abandoned). Injection well #1 averaged 24 psig and injection well #2 averaged 42.5 psig. The permitted injection limit was set at 105 psig, with a maximum recorded pressure of 60 psig during that month. Average injection rate for the two respective wells was 850 gpm and 725 gpm, with a monthly total injection volume of 16, 568,500 gallons and 8,777,100 gallons. In contrast, during January, 1996, injection well IJ-1 was used but had significantly less volume. Average injection pressure was 9.5psig. The injection rate averaged 850 gpm, with a total injected volume of 292,400 gallons.

Financial responsibility for well plugging and abandonment has been assured by RMGC through an Oil/Gas or Geothermal Exploration Bond in the amount of $50,000.

Geologic Setting/Hydrogeology/Geothermal Characteristics: Outcropping mine host-rocks, at the range front, are variably welded Tertiary as flow tuffs, similar to bedrock underlying the injection site. West, toward the Big Smoky Valley floor, alluvial deposits thicken to 3000 to 5000 feet and form the regional aquifer, termed the valley fill aquifer. The detailed hydrogeology of the permit area is not completely understood. The system consists of an unconfined alluvial aquifer, generally thickening westward, and an underlying

unconfined fractured bedrock aquifer. Structural barriers are present, but no confining layers are known to exist in the alluvial aquifer. The permeability of the bedrock aquifer is fracture dependent. Geochemical and temperature data, provided below, suggest that the two aquifers are hydraulically connected.

The alluvium in the area of injection is partially saturated. The static water level at IJ-1 is not available, but depth to water at the nearby monitoring well, MW-4, was 347 feet below ground surface on September 1997. Depth to water, in 1993, at nearby MW-8 (now

Table 1

Constituent	Injectate Entering Injection Well IJ-1 2/28/94	Injectate Entering Injection Well IJ-1 1/09/96 (From RMGC Renewal App.)	Receiving Waters- *EH-970, Adjacent to IJ-1 4/14/87
pH	8.61	8.84	9.0
TDS	326	360	364
Ca	2.1	2.9	3.4
Mg	<0.1	0.023	2.6
Na	110	110	100
K	3.1	2.9	2.5
SO_4	39	39	42
Cl	9.8	11	17
Nitrate (as N)	<1	<1	1.2
HCO_3	127	132	87
CO_3	N.A.	N.A.	30
Alkalinity $CaCO_3$	120	128	N.A.
F	20	21	17.4
As	.052	.068	.055
Fe	.062	.11	7.8
Mn	<.3	<0.03	0.07
Cu	<0.025	<0.025	<0.02
Zn	<0.05	<0.05	<0.01
Ba	<0.1	<0.1	<0.4
B	0.20	0.22	0.2
Cd	<0.0005	<0.0005	<0.01
Cr	<0.025	<0.025	<0.02
Pb	<0.005	<0.005	N.A.
Hg	<0.001	<0.001	<0.0005
Se	<0.005	<0.005	<0.005
Ag	<0.025	<0.025	<0.01
Li	.28	.28	0.3
Sr	.15	.16	N.A.
Si	N.A.	78	55

All values in mg/l, unless otherwise noted
N.A. Not analyzed/available
TDS Total Dissolved Solids
* EH-970 is and exploration/condemnation hole

abandoned) was approximately 300 feet. Depth to water at the currently monitored and reported wells, GMW-1 and GMW-2, (October 1998) was 166.9 feet and 262.8 feet, respectively. Pit dewatering was initiated in the Spring of 1990, and in the pit area cumulative drawdown has been about 400 feet. Regionally, groundwater flow is toward the valley floor, from east to west. Dewatering wells are currently east of the range front fault, which acts as a hydraulic "semi-barrier" to groundwater flow. The drawdown cone, related to pit dewatering, to date has not significantly impacted flow direction at the injection or production wells, where flow is still generally from east to west. However, in this area of the alluvial fan groundwater levels have dropped about 6 to 8 feet since dewatering began and the hydraulic gradient has somewhat flattened with subsequent lower flow velocities. It is likely that as dewatering continues, with planned pit expansion toward the west, and as dewatering wells are placed west of the range front fault, the groundwater velocities will decrease further, with flow possibly diverted more toward the north. Future changes of the hydrologic regime could also influence groundwater chemistry.

Ground water temperatures in the geothermal area range from 112 Deg. F to 192 Degrees F. However, the influence of the geothermal system is aerially extensive, with warm water noted in the pit area and warm water noted as far west as monitoring wells GMW-1 and GMW-2. Exploration/Condemnation hole EH-1002 (TD of 305 feet), drilled near GMW-1, has a recorded bottom temperature of 101 Deg F. EH-999 (TD 605 feet) drilled near GMW-2 has a recorded bottom temperature of 120 Deg. F.

1999 Changes: Proposed changes to the new permit are mainly format related. Maximum allowable injection pressures and volumes, and the allowable number of wells, remains the same. Some changes have been made to sampling frequency and sampling parameters. Sampling of an extended list of constituents and parameters from the monitoring wells, when not injecting, will now only be required annually (during the fourth quarter). Sampling of key fluid constituents and parameters from the injectate and monitoring wells will be required every first and second quarter, when the geothermal heating system is in operation. Additionally, when the system is in operation, narrative reports and summaries of injection data will be respectively required quarterly. The constituents beryllium, chromium and nickel have been dropped from sampling requirements, due to historic low reporting values, and antimony and thallium have been added because they are recent additions to the primary drinking water standards. One additional monitoring well has been added, shallow aquifer monitoring well MW-101, adjacent to GMW-1 The permit will be issued with a monitoring summary and check list to be returned with each report, to assist the permittee and the UIC program staff in ensuring that all permit conditions for monitoring are submitted.

C. Receiving Water Characteristics

Geothermal fluids are injected back into the same geothermal reservoir, consisting of fractured tuff. The injection zone is at approximately the same interval as the production zone. The receiving water characteristics are determined from exploration hole EH-970, drilled to a depth of 640 feet, and from other nearby wells. As noted in Table 1, the receiving waters have similar levels of arsenic and fluoride, and additionally, exceed standards for iron. The injection process therefore should not degrade waters of the State. Arsenic values for two shallow monitoring wells, MW-4 (TD=370 feet) and MW-101 (TD= 200 feet), respectively located near IJ-1 and adjacent to GMW-1, average over 0.1 mg/l arsenic and exceed fluoride standards. Arsenic by itself can not be used exclusively as an active geothermal system indicator because of extensive arsenic geochemistry in altered

rocks in the mine area. However, in conjunction with the fluoride anomalies, portions of the shallow aquifer appear to be influenced by the geothermal system, suggesting movement and local shallow concentration of natural geothermally influenced fluids. Water quality at the deep monitoring wells, GMW-1 and GMW-2 is good (does not exceed MCLs), and constituents do not exceed drinking water standards. Water quality of the alluvial aquifer also improves, moving north along the alluvial fan.

D. Procedures for Public Comment

The Notice of the Division's intent to reissue a permit authorizing the facility to inject into the ground water of the State of Nevada subject to the conditions contained within the permit, has been sent to the *Tonopah Times-Bonanza and Goldfield News* for publication no later than August 28, 2008. The notice will be mailed to interested persons on our mailing list. Anyone wishing to comment on the proposed permit can do so in writing for a period of 30 days following the date of the public notice.

All written comments received during the comment period will be retained and considered in the final determination. A public hearing on the proposed determination can be requested by the applicant, any affected state, any affected interstate agency, the regional administrator of EPA or any interested agency, person or group of persons.

Any public hearing determined by the Administrator to be held must be conducted in the geographical area of the proposed discharge or any other area the Administrator determines to be appropriate. All public hearings will be conducted in accordance with NAC 445A.238.

The final determination of the Administrator may be appealed to the State Environmental Commission pursuant to NRS 445A.605.

E. Proposed Determination

The Division has made the tentative determination to modify and reissue the permit contingent upon comments received during the public comment period and the public hearing. If no significant negative impacts due to injection are identified during this process, it is the intent of the Division to reissue the permit.

F. Limitations and Special Conditions

Injectate and receiving waters have similar characteristics and both exceed MCLs for several constituents. The purpose of the monitoring wells is to ensure that fluid injection does not degrade better quality waters, located to the west, at depth. While injectate limits are not imposed, the water quality at the monitoring wells is expected to remain below MCLs, and if any adverse trends are noted from monitoring well water quality, then the Division may impose further restrictions on, or shut down, the injection operation. Similarly, to ensure that Waters are not degraded by leakage from the heated cyanide-bearing barren solution to injectate, through unnoticed breaks in conduits, a leak detection system has been installed at the heat exchanger. The cyanide bearing barren solutions have a significantly higher electrical conductivity. The detection system consists of an electrical conductivity meter installed in the injection pipeline with daily readings taken. Any increases in electrical conductivity of the injectate would require prompt and appropriate repair or shutdown of the system.

G. Rationale for Permit Requirements

Verification that the quality of fluid discharged to the injection well(s) remains constant. Confirmation that fluids disposal does not adversely affect the existing hydrologic regime.

Prepared by: Karl Kanbergs, Bureau of Water Pollution Control
Date: August, 1999

Updated August 15, 2008